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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/685,197	10/10/2000	Timothy R. Miller	194588US8	4309

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EXAMINER	
LIU, SHUWANG	
ART UNIT	**PAPER NUMBER**
2634	

DATE MAILED: 12/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/685,197	MILLER ET AL.	
	Examiner	Art Unit	
	Shuwang Liu	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 August 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-84* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,6,8,9,17,23,32,33,35,38,45,52-55,59-61,69 and 75* is/are rejected.

7)☒ Claim(s) *4,5,7,10-16,18-22,24-31,34,36,37,39-44,46-51,56-58,62-68,70-74 and 76-84* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *05/27/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 08/26/04 have been fully considered but they are not persuasive. The Examiner has thoroughly reviewed Applicant's arguments but firmly believes that the cited reference reasonably and properly meets the claimed limitation as rejected.

(1) Applicant's argument – "nothing in Withington discloses the use of separate acquisition and tracking modes, nor does anything in these documents disclose transitioning between an acquisition mode and a tracking mode based on a comparison of any kind of SNR measurement."

Examiner's response – On page 1188, Withington discloses that "The tracking correlator varies the phase of internal coded template until it synchronizes with and able to track the received pulse train." One skilled in the art should understand that the acquisition is also called by the synchronization (for example, see Chung et al., US 5,642,377, column 1, line 51). Here, Withington teaches if synchronization is detected, the tracking mode takes over. Furthermore, Withington teaches that the tracking point is related to the SNR (see page 1188). Therefore, Withington et al. discloses an Ultra-Wideband receiver comprising a controller for controlling transitions between synchronization states that include an acquisition mode and a tracking mode based on SNR.

(2) Applicant's argument – "Although Chung does disclose how a real time SNR estimate can be determined (See, e.g. Chung, column 13, lines 21-27), this not the

same as comparing the SNR estimate with an SNR threshold." Furthermore, the applicant argues that "T_{SC}" used by Chung is not SNR threshold.

Examiner's response – As discloses in column 5, lines 15-42, Chung et al. discloses that "The conventional serial search algorithm detects a signal having a level that exceeds a threshold which is determined by employing an expected SNR of the communication environment. Furthermore, Chung et al. discloses that "the signal classification threshold T_{SC} is equivalent to the threshold used in the conventional serial search acquisition system. Therefore, the threshold T_{SC} is the SNR threshold, which is used for comparison (column 5, line 30-column 6, lines 29, note: the search process is the acquisition process). The acquisition system of the invention of Chung et al. uses a signal dependent adaptive optimal threshold (for example, T_{SC}) and stops the acquisition process after detected synchronization, a tracking loop (mode) takes over (column 4, lines 15-25 and column 5, lines 5-9). Here, Chung et al. also teaches the use of a tracking mode.

(3) Applicant's argument – "they also do not discloses or suggest both identifying at least two parameters that combine to form an indirect measure of a signal to noise ratio of an incoming UWB signal."

Examiner's response – As shown in equation 14 and column 13, lines 21-31, Chung et al. discloses two parameters E and T_{SD} that combine to form an indirect measure of a signal to noise ratio SNR of an incoming signal. SNR is corresponding signal classification threshold T_{SC}. As discussed in above (2), T_{SC} is equivalent to the threshold used in the conventional serial search acquisition system.

Claim Objections

2. Claims 27-31, 48-51 and 79-84 are objected to because of the following informalities:

Change "AGC" in claims to - -automatic gain control (AGC)- -.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-3, 6, 8, 9, 17, 23, 32, 33, 35, 38, 45, 52-55, 59-61, 69 and 75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Withington et al. (IEEE, 1999, IDS, #7) in view of Chung et al. (US 5,642,377).

Withington et al. discloses an Ultra-Wideband receiver comprising a controller for controlling transitions between synchronization states that include an acquisition mode and a tracking mode based on SNR (page 1188).

Withington et al. does not disclose a detail method to control the transition by using SNR, that is, the steps :identifying an in-band measure of a signal to noise ratio of an incoming signal; comparing the in-band measure of signal to noise ratio identified in

the identifying step with an in-band signal to noise ratio threshold; and transitioning between the acquisition mode and the tracking mode when in the comparing step it is determined that the in-band measure of signal to noise ratio has satisfied a predetermined criteria relative to in-band signal to noise ratio threshold.

However, as shown in figures 2-9, Chung et al., in the same field of endeavor, teaches:

(1) regarding claims 1 and 35:

A method and a controller for controlling in a receiver transitions between synchronization states that include an acquisition mode and a tracking mode, comprising the steps of

identifying an in-band measure of a signal to noise ratio of an incoming signal (equation 14 and column 4, lines 1-14);

comparing the in-band measure of signal to noise ratio identified in the identifying step with an in-band signal to noise ratio threshold (column 4, lines 1-34, see block 28 in figure 2 and column 2, lines 61-65 and column 5, lines 8-42); and

transitioning between the acquisition mode and the tracking mode when in the comparing step it is determined that the in-band measure of signal to noise ratio has satisfied a predetermined criteria relative to in-band signal to noise ratio threshold (column 4, lines 14-34, column 5, lines 8-42 and column 13, line 21-column 14, line 20).

(2) regarding claims 53 and 60:

A receiver configured to transition between an acquisition mode and a tracking mode, comprising:

an analog to digital converter (column 8, lines 35-45) configured to sample an incoming signal;

a processor (column 7, lines 3-45);

a computer program product having computer readable instructions that when executed by the processor perform (column 14, lines 21-34) steps of

identifying an in-band measure of a signal to noise ratio of an incoming signal (equation 14, column 4, lines 1-14 and column 5, lines 8-42);

comparing the in-band measure of signal to noise ratio identified in the identifying step with an in-band signal to noise ratio threshold (column 4, lines 1-34, see block 28 in figure 2 and column 2, lines 61-65 and column 5, lines 8-42); and

transitioning between the acquisition mode and the tracking mode when in the comparing step it is determined that the in-band measure of signal to noise ratio has satisfied a predetermined criteria relative to in-band signal to noise ratio threshold (column 4, lines 14-34, column 5, lines 8-42 , and column 13, line 21-column 14, line 20).

(2) regarding claims 8 and 38:

A method and a controller for controlling in a receiver transitions between synchronization states that include an acquisition mode and a tracking mode, comprising the steps of

identifying at least two parameters (T and E in equation 14) that combine to form an indirect measure of a signal to noise ratio of an incoming signal (column 4, lines 1-14);

determining a control threshold parameter from a mathematical combination of the at least two parameters ((column 4, lines 1-34, see block 28 in figure 2 and column 2, lines 61-65); and

transitioning between the acquisition mode and the tracking mode when the control threshold is set to a predetermined value (column 4, lines 14-34 and column 13, line 21-column 14, 20).

(3) regarding claim 32:

A mode controller for switching between an acquisition mode and a tracking mode of a receiver, comprising:

an acquire state machine configured to determine when an incoming signal is acquired by said receiver (column 4, lines 14-34);

a track state machine configured to maintain synchronization with the incoming signal after the signal has been acquired in said acquire state machine (column 4, lines 14-34 and column 5, lines 8-42); and

a control mechanism configured to control a transition between the acquire state machine and the track state machine when an in-band measure of signal to noise ratio satisfies a predetermined condition (column 4, lines 14-34, column 5, lines 8-42 and column 13, line 21-column 14, line 20).

(3) regarding claim 52:

A mode controller for switching between an acquisition mode and a tracking mode of a receiver, comprising:

means for determining when an incoming signal is acquired by said receiver (column 4, lines 14-34);

means for maintaining synchronization with the incoming signal after the signal has been acquired in said means for determining (column 4, lines 14-34);

means for estimating an in-band signal to noise ratio (equation 14 and column 5, lines 8-42); and

means for controlling a transition between the acquire mode and the tracking mode when the estimate of signal to noise ratio satisfies a predetermined condition (column 4, lines 14-34, column 5, lines 8-42 and column 13, line 21-column 14, line 20).

It would be desirable to have more accuracy, more reliability, and more controllability in detection of synchronization in a communication system (column 4, lines 30-34). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the method and the controller of controlling a transition between the acquire mode and the tracking mode as taught by Chung et al. in the UWB receiver of Withington in order to allow the receiver to have more accuracy, more reliability, and more controllability in detection of synchronization.

Chung further discloses:

(1) regarding claims 2 and 54:

wherein said identifying step includes calculating an estimate for an actual in-band measure of signal to noise ratio (column 12, line 1-column 13, line 40).

(2) regarding claims 3 and 55:

wherein said transitioning step includes transitioning between modes each time it is determined in the comparing step that the in-band measure of signal to noise ratio has either surpassed, or dropped below the in-band signal to noise ratio threshold (claims 1 and 2, column 4, lines 14-34 and column 13, line 21-column 14, line 20).

(3) regarding claims 6, 59 and 75:

wherein the transitioning step includes transitioning from said acquire mode to a predetermined number of alternative track states in said track mode (claims 1 and 2, column 4, lines 14-34 and column 13, line 21-column 14, 20).

(4) regarding claim 61:

identifying at least two parameters (T and E in equation 14) that combine to form an indirect measure of a signal to noise ratio of an incoming signal (column 4, lines 1-14);

(5) regarding claim 69:

wherein the identifying step further comprising the steps of computing a signal parameter related to signal power (T in equation 14); and computing a noise parameter (E in equation 14) related to noise power (column 13, lines 21-28).

(6) regarding claim 9:

wherein the identifying step identifies the at least two parameters as an indirect measure of an in-band signal to noise ratio of the incoming signal (column 12, line 1-column 13, line 35).

(7) regarding claim 17:

wherein the identifying step further comprising the steps of computing a signal parameter related to signal power (T in equation 14); and computing a noise parameter (E in equation 14) related to noise power (column 13, lines 21-28).

(9) regarding claims 23 and 45:

wherein the transitioning step includes transitioning between a predetermined number of alternative track states (claims 1-3).

(10) regarding claim 33:

wherein the track state machine comprises: a processor configured to determine the in-band measure of the signal to noise ratio of the incoming signal and calculate whether the in-band measure of signal to noise ratio satisfies a predetermined criteria that corresponds with a predetermined bit error rate (column 4, lines 14-34, column 5, lines 8-42 and column 13, line 21-column 14, 20).

Allowable Subject Matter

5. Claims 27-31, 48-51 and 79-84 would be allowable if rewritten to overcome the objections, set forth in this Office action.

6. Claims 4, 5, 7, 10-16, 18-22, 24-26, 34, 36, 37, 39-44, 46, 47, 56-58, 62-68, 70-74 and 76-78 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten (1) in independent form including all of the limitations of the base claim and any intervening claims and (2) to overcome the objections set forth in the section of claim objections of this office action.

7. The following is a statement of reasons for the indication of allowable subject matter: the prior art fails to teach a method for switching between an acquisition mode and a tracking mode in a UWB receiver, comprising the steps of: monitoring an amplitude of an incoming UWB signal; determining a state parameter from the amplitude based on a noise variance of the incoming UWB signal determined during AGC initialization; and controlling a transition from the acquisition mode to the tracking mode when the state parameter is set to a predetermined value. Furthermore, the prior art fails to teach the step of setting a vector length of samples of the incoming UWB signal to a predetermined number so a transition between modes will occur while the UWB receiver is exhibiting a predetermined reception performance.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shuwang Liu whose telephone number is (571) 272-3036.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin, can be reached at (571) 272-3056.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9306 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

Shuwang Liu
Primary Examiner
Art Unit 2634

December 14, 2004